

Variation in the Dermaptera.

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Variation in the Dermaptera is strongly marked, and of great importance even from the purely systematic point of view, since several forms of this phenomenon which run almost throughout the group, have the effect of altering greatly the superficial appearance of the creatures, and so have caused an excessive multiplication of so-called species.

It is most necessary for the student to grasp the principle forms of variation in the Dermaptera, so that he may recognize the phenomenon when he sees it, and thus avoid the error of regarding as a new species what is nothing more nor less than a well-known form of polymorphism.

Variation in Dermaptera may be in colour above, or in the actual morphology.

I. VARIATION IN MORPHOLOGY.

Two kinds of morphological variation occur so persistently through the Dermaptera that they afford regular cases of dimorphism: these are brachypterism and macrolabiism.

A. BRACHYPTERISM.

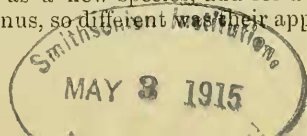
This striking phenomenon, which earwigs share with the true Orthoptera, with the Rhynchota, and doubtless with other insects, is very general in the Dermaptera. Most known fully-winged species are frequently brachypterous and indeed when the rarer forms are better known, it is quite possible, if not even probable, that this kind of dimorphism will be found to run throughout the order.

When the organs of flight are in repose the wings are almost entirely concealed by the elytra, only the chitinous squamæ or wing-scales projecting beyond them; as these are frequently highly coloured, it is evident that their absence must materially alter the appearance of the creature, but even when shortened, they may be usually found by lifting the elytra and looking beneath them.

These dimorphic forms are often given the rank of varieties, and we frequently find the expression "var. *longipennis*," "var. *brevipennis*," "var. *macroptera*," and "var. *brachyptera*"; it is not really necessary to dignify them with special names, if it is borne in mind that macropterous and brachypterous forms occur probably in all fully-winged species. It is fairly safe to assume that the macropterous form is the normal one, and brachypterism the deviation.

But it is important to remember that in brachypterous forms, the elytra too, are often involved, being somewhat shortened and truncate; for instance, *Tomopygia abnormis*, Borm., from Java, was for about thirty years known only from the unique type in the Vienna Museum, a brachypterous male, with decidedly short elytra, which was almost treated as a generic character. But Mr. Jacobson found several females at Samarang, all of macropterous form, with the elytra twice as long as in the type and the wing-scales protruding prominently; these narrowly escaped being described as a new species, and for a moment they appeared to require a new genus, so different was their appearance.

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The species being so long known only in the brachypterous state, it is natural at first glance to look upon these macropterous individuals as varieties or aberrations; it will be interesting to see which form is actually the commoner.

Another instance is that of *Spongovostox kristenseni*, Burr, from Abyssinia. Mr. Kristensen sent over a large series, in which both forms in both sexes were well represented; the difference in appearance was heightened by a simultaneous colour variation, but the fortunate possession of a long series from one locality made it evident that it was merely another instance of what might be called pterodimorphism.

A further interesting example is afforded by the common earwig, *Forficula auricularia*, Linn., the macropterous form of which is exceedingly abundant in Europe; but a brachypterous form however exists, which is very rare; as the elytra are shortened also, and by correlation the pronotum is somewhat broadened, this has been described as a distinct species by Targioni-Tozzetti (*F. silana*, Targ.), and by Brunner (*F. targionii*, Br.), but the only so-called specific characters are the abbreviation of the wings, slight shortening of the elytra, and widening of the pronotum, which is a frequent correlative with brachypterism: the noteworthy point in this connection is that while the normal macropterous *F. auricularia* is abundant throughout Europe, the brachypterous *F. silana* is confined to Italy, so far as we know, with the rather surprising exception of a couple of females recorded from the Isle of Wight.

Instances of the description of the brachypterous and macropterous forms of one and the same species, as totally distinct forms, even placed in different genera, are by no means rare: thus *Forficula miranda* of de Bormans is the normal macropterous form of his *Labia aculeata*, the species being now assigned to the genus *Nesogaster*.

Some species are still only known in one of the two forms, thus *F. lurida*, Fisch., *L. smyrnensis*, Serv., and many others, are only known in the macropterous form, whereas *F. pubescens*, Gén , *F. lesui*, Finot, *F. decipiens*, Gén  and many others only in the brachypterous; probably *F. decipiens*, Gén , and *F. lurida*, Finot, are a pair forming one species, as in the cases of *F. silana* and *F. auricularia*; in *F. rodziankoi*, Sem., and *F. senegalensis*, Serv., both forms occur.

The variation in the shape of the pronotum (where not sexual as in the *Diplatyinae*) is really correlative with brachypterism; it is very usual in macropterous forms to find the pronotum more or less widened posteriorly, apparently to accommodate the muscles which work the wings; but when in the same species the wings are reduced, the pronotum is correspondingly reduced by being narrower posteriorly and so parallel-sided, as in *Marava wallacei*, Rahn., and many other *Labiidae*, or by being shorter and broader, as in *F. silana*.

In the two forms of *Tomopygia abnormis*, Borm., however, the pronotum is very small and narrow and in the very plastic highly polymorphic *Labidura riparia*, Pall., the difference between the two shapes of the pronotum is very marked.

It is worthy of mention that in the *Chelisochidae*, in which group this dimorphism is less marked than in many others, the usual form of the pronotum is rather long, and distinctly widened posteriorly, and in this family, macropterism is the rule.

B. MACROLABIISM.

This is a form of structural variation that is almost, if not quite, confined to the male sex, since it consists in often extreme elongation of the forceps, which are almost invariably more ornate and complex in the male than in the female; they may be compared to the antlers of deer.

There are two forms of the forceps in most species, a normal, short or "low" form, and a very elongate, or "high" form, but intermediates are rare or unknown. Messrs. Bateson and Brindley (1892) examined a thousand specimens of the common earwig (*P. auricularia*, L.), collected in one day on three small islands known as the Knocksies and Widerpern, in the Farne Islands, off the coast of Northumberland, and found that 583 were males; the length of the forceps varied between 2.5mm. and 9mm., the commonest length is about 3.5mm. and about 7mm.; the mean form, 4mm.-6mm., is comparatively rare; in the female the length of the forceps scarcely varied at all. We quote Messrs. Bateson and Brindley's observations upon these results:—

"It is perhaps unnecessary to say that this result is of considerable importance to an appreciation of the way in which variation may occur. There is here a group of individuals living in close communion with each other, high and low, under the same stones. No external circumstance can be seen to divide them, and yet they are found to consist of two well marked groups, containing about equal numbers. To those who are acquainted with the chapter on Organic Stability in Galton's *Natural Inheritance*, this will be recognised as an instance of variation about two positions of stability, the intermediate position being one of less stability. In the common language of naturalists, the facts of this case suggest that there is, for some wholly unknown reason, a dimorphism among the males of these Earwigs, maintained though all live together. In cases of dimorphism some have thought fit to speculate on the possible utility of the phenomenon. We know no basis of fact from which these discussions may be properly attempted, and we leave these matters to those who are satisfied with such methods of biological inquiry and have leisure and ingenuity to pursue them."

When the forceps are thus elongate, the effect is just as though they were elastic and had been stretched, each part being extended in proportion, but in this genus *Forficula*, L., and many others, the male forceps have two distinct portions, a basal dilated portion, and an attenuate apical portion; the proportions between these two parts is often of specific value; in the macrolabious forms, the dilated part is duly extended with the slender apical part, so that the proportions are approximately preserved. Thus, a vertical tooth on the upper surface of the forceps in *Skalistes lugubris* is drawn out into a compressed and acute ridge or crest in the macrolabious form which is known as the "var. *metrica*."

The varietal name *forcipata* is often given to the macrolabious form, but "var. *macrolabia*" occurs too; for the sake of uniformity, and on account of the very general occurrence of the phenomenon, I prefer not to use the varietal names, but to speak of the macrolabious and cyclolabious forms respectively.

The macrolabious form of the common earwig is well-known, and generally called var. *forcipata*, Steph. It is curious that it seems to be

most frequent in islands and in mountains. Navas has suggested that we may look upon it as a wild, savage race, and upon the commoner cyclolabious form as a more or less domesticated race.

In very many cases both forms are known, the cyclolabious being as a rule the commoner; such is the case in *Labia videns*, Borm., and many species of *Forficula*, but the macrolabious form seems to be a little commoner in *Flannon bipartitus*, Kirby.

Only the cyclolabious form is known in several groups, as in many *Pygidicranidae*, *Psalinae*, *Esphalmeninae*, and others: only the macrolabious form in *Anchenomus longiforceps*, Karsch., *Spongiphora croceipennis*, Serv., *Allodahlia*, *Forcipula*, *Nesogaster dolichus*, *Endohrnia metallica*, and many *Opishtocosmiinae*.

An exceptional case is offered by *Adiathetus shelfordi*, Burr, in which the male is only known in the cyclolabious form, and the female in a highly developed macrolabious form; only the macrolabious form is known in both the sexes in *Chelisochella superba*, Dohrn, and *Adiathetus tenebrator*, Kirby, *Enkrates elegans*, Borm., and a few other *Chelisochidae*.

The difference in appearance between the two forms in *Chelidura alpina*, and *Pseudochelidura sinuata*, Germ., is ample excuse for the former treatment of the two forms in each case as distinct species.

Other forms of morphological variation occur in the forceps, which are remarkable for their instability.

The actual number and relative position of the teeth which often form the armature of these organs is very variable, and numerous so-called sub-species have been raised on the slender basis of the exact position of the tooth; thus in *Spongiphora croceipennis*, Serv., there is usually a small tooth near the middle; sometimes it is at the middle itself, sometimes near the base, sometimes near the apex, sometimes it is absent altogether: to this instability we owe the existence of the names *parallela*, Westw., *therminieri*, Serv., and *dysoni*, Kirby, which de Bormans ranked as subspecies; similarly, *Proreus simulans*, Stål., has a strong median tooth, but when this is absent it is the "subspecies *modesta*, Stål.," of de Bormans; the same remark applies to *Nala liridipes*, Duf., and its "subspecies *vicina*, Luc."

In those species in which the branches of the forceps are normally bowed, or strongly arcuate, it is common enough to find specimens feebly nourished and ill-developed, in which the curvature is far weaker; we get every degree from a very gentle curve to an abrupt almost right-angled head, in *Forficula schlagintweitii*, Burr, *F. decipiens*, Géné, *F. lurida*, Fisch, and several *Ancistrogastrinae*, in which the forceps have a well-marked group-form, with a strongly bent forceps.

A rather curious variation occurs in the protean *Labidura riparia*, Pall. Normally the males of this species have a pair of short spines or points in the middle of the posterior margin of the last dorsal sclerite; these may be missing, as in the "var. *inermis*, Br.," or there may be only one present, and that in the middle, as in the form *pluvialis*, Kirby.

Pantel (1912) refers to the fluctuation in the number and appearance of the chromosomes in *Forficula auricularia*, and quotes works by de Sinety, Zweiger, Stevens, Carnoy and La Valette on the subject.

II. COLOUR VARIATION.

The coloration of earwigs is very unstable. Frequently, the

antennæ have what is termed a pale ring, either near the base or near the apex; in other words, in dark antennæ, some segments are pale but it is far from constant which particular segments are the pale ones; a slightly different coloration of the two basal segments is very frequent; generally it is two or three segments short of the apical ones that are pale, but the inconstancy of the particular segment is seen in *Anisolabis annulipes*, Luc.

The coloration of the legs is also very inconstant; in a single species we may find specimens with pale legs, with dark legs, or with pale legs variously ringed, banded, or spotted with dark; this too, is well seen in *Anisolabis annulipes*, Luc.

It is very usual for the elytra to present in one species every gradation from uniform dark to distinct and well-marked alternate dark and pale bands; the banding first shows itself in a small spot near the shoulder; gradually the spot lengthens until it occupies almost the whole of the disc, leaving a narrow stripe of the ground colour on each side; this is well seen in *Prolabia nigrella*, Dubr., in which the elytra are black in the typical form, have a relatively large pale shoulder spot in the form *fasciata*, Borm., or a broad band in the form *myrmeca*, Burr.

The small Neotropical species of *Labia* and *Spongorostox* often present every gradation from all black to strongly banded elytra. It is especially noticeable in *Allostethella donae*.

In many species it is common to find the elytra either unicolorous, or with a pale or red spot: we see this in *Echinosoma wahlbergi*, *Ancistrogaster mixta*, and others. There is an extreme case in the spotted Neotropical species of *Psalis*, where we have a regular transition in size and brachypterism, as well as in colour, through *P. pulchra*, *P. festiva*, *P. americana*, and *P. gagatina*; as a rule there is a large bright orange discoidal spot; sometimes this occupies the whole of the disc, sometimes it is quite small, and in some cases it is shaded over with fuscous brown to such an extent that it is almost entirely obscured.

In the Palearctic *Anechura bipunctata*, this variation has a geographical value; in the truly European form occurring commonly in the Alps, the general colour is dark, with a reddish spot on the elytra; as we trace the species eastwards through its range into Asia, the colour becomes paler and brighter, the spot finally occupying almost the whole of the elytra, with a narrow black margin in the Himalayo-Tibetan form *A. zubovskii*, Sem. The intermediate forms are *A. bipunctata* var. *orientalis*, Kr., and *A. asiatica*, Sem.

In the *Pygidicraninae*, the varied patterns of the elytra, wings and pronotum are often very inconstant in detail, though fairly stable in general disposition; we may for instance find the pronotum almost entirely buff, or with a faint black mark, or a pair of black bands, or a black V, or an irregular black star; this is noticeable in *Kalocrania daemeli*, Dohrn.

In *Echinosoma sumatranum* we find specimens ranging from a light brown to nearly black, some with labrum blackish, some with labrum buff; some with yellow pronotum, some with black; some with plain black elytra, some with red-spotted elytra; some with black-ringed femora, some with plain tawny femora.

One of the worst offenders is the universal *Labidura riparia*, as we should expect from its immense range. The typical Palearctic form is

pale buff, which turns to blackish after death; ivory-like forms are known from Transcaucasia (subsp. *eburnea*) and South America (subsp. *virida* and *xanthopus*); the head varies from pale yellowish to black; the pronotum from tawny to black; with or without a pale border or median reddish band; the elytra vary from tawny to black; a narrow reddish band is usually visible; the wings (when developed) may be buff or brown, plain or black-spotted; the abdomen tawny, with faint dark band, or dark chestnut, with or without a band, or black; small wonder that so protean a kind, with a universal distribution, has been described and named times without number.

The common earwig, *Forficula auricularia*, is distributed throughout Europe, and Western Asia, and Northern America, and now is establishing itself in North America and New Zealand, yet it varies very little. The only colour variation that I know is one from the Levant, in which the abdomen, instead of being of a deep claret colour, is a brilliant light chestnut.

In *Prolabia annulata*, the elytra are of a plain blackish-brown ("*L. arcuata*"), or shining lustrous purple ("*L. chalybea*").

Pale and feebly developed specimens have probably suffered from insufficient nourishment during the earlier instars, or else they may be individuals that have been wounded when tender from fresh emergence from the nymphal skin.

A few Notes in Reply to Dr. Verity's "Answer."

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I am not quite sure whether it is wise to continue this discussion, however interesting and however tempting it may be to do so, since I believe that in his main contentions Dr. Verity stands alone among entomologists, but perhaps it would be as well to make a final attempt to clear up the matter so far as present practical possibilities are concerned.

It seems to me that Dr. Verity has lost sight of the fact that the whole system of "types" is purely conventional, and has no scientific value whatever. If he replies that it ought to have, I can only say that I entirely agree with him, and have long ago argued the matter at length (*Ent. Record*, xvi., pp. 200, 231, and *Butts. of Switz.*, Introduction). I believed then, and still believe, that the whole system is unscientific and absurd, but I am quite convinced that neither he nor I have the power to make any alteration in the generally accepted plan, and that we must accept the usual conventions at their received valuation. The whole question has been greatly complicated by the controversies on "nimitypical" races, but for this a great mitigation has been adopted in some quarters by naming every race of a species, the original specific name belonging equally to all, but not to the particular race originally described any more than to every other form of the same species. The general acceptance of this plan would no doubt remove Dr. Verity's objections to the present use of some specific names, and also many other difficulties raised by other writers. Meanwhile, if Dr. Verity will reflect that the whole system is one of convention, he will, I think, see that it is to the general advantage of stability in nomenclature to accept those conventions which have been agreed upon by almost universal consent, one of which regulates the question as to